

STUDY OF RESULTS OF ENDER NAILING AND CANNULATED CANCELLOUS SCREW IN THE TREATMENT OF INTERTROCHANTERIC FRACTURE FEMUR

Bhavik Dalal, Tarkik Amin, Archit Gandhi, Rohit Shah

Smt NHL Municipal Medical College, Ahmedabad, Gujarat, India

Correspondence to: Bhavik Dalal (drbhavik2006@gmail.com)

DOI: 10.5455/ijmsph.2013.2.469-473 Received Date: 18.10.2012

Accepted Date: 23.10.2012

ABSTRACT

Background: Intertrochanteric fracture of femur is one of the most common fractures seen in general population. Till date various fixation devices are used for fixation of this fracture that includes both extra medullary and intramedullary implants. Ender and Simon Weidner popularised the condylocephelic intramedullary nailing for this fracture. But it is seen that fracture treated by ender nailing alone resulted in varus malunion.

Aims & Objective: Along with ender nail we added the cannulated cancellous screw which results in controlled collapse of the fracture with union in anatomic position.

Material and Methods: We studied 50 patients of intertrochanteric fracture treated by ender nail and cannulated cancellous screw between year 2009 to 2011. Follow up assessment was done by Harris hip score.

Results: The union achieved in mean time of 7 weeks. In study of 50 patients we obtained 86% excellent to good results. 14% patient had fair to poor results.

Conclusion: We found that use of Ender nail and cannulated cancellous screw results in fracture union in more anatomical position with better patient compliance and early mobilization.

KEY-WORDS: Cannulated Cancellous Screw; Ender Nail; Fracture Union; Intertrochanteric Fracture

Introduction

Intertrochanteric fracture^[1,2] of femur is one of the most common fractures seen in general population caused by low velocity trauma in old age group due to osteoporosis^[3] while high velocity trauma is the cause in young population. Intertrochanteric region is defined as the region in proximal femur lying between greater trochanter and lesser trochanter is^[4,5]- (1) At junction of cortical & cancellous bone (2) High stress concentration on medial border. The area is enveloped by thick strong muscle surrounding proximal femur. Management of this fracture is difficult because this zone of femur is subjected to maximum amount of mechanical stress; tensile and compressive stresses can exceed several times the body weight (causing failure of implants). Associated comminution and short proximal fragments (which are displaced by hip flexors and abductors) make reduction of fractures difficult.^[6] Both intra-medullary and extra medullary implants^[6,7] are used in treatment of this fracture that includes the first intramedullary nail-Kuntscher nail^[8] followed by

evolution of gamma nail^[9,10], Zickle nail^[11], Jewett nail^[12] and proximal femoral nail^[13]. The extra medullary implants include Smith – Peterson nail^[14], Dynamic hip screw^[15] and Angle blade plate^[16,17]. Ender and Simon Weidner^[18] popularized the concept of closed condylocephelic nailing for intertrochanteric fractures in 1970. The clinical experience of authors revealed that Ender nailing alone cannot provide secure fixation in elderly patients with osteoporosis. The insertion of cannulated cancellous screw after ender nail is introduced resulted in controlled collapse of the fracture in which the cannulated cancellous screw acts as guide and directs the collapse of fracture in its direction. So the neck shaft angle remains maintained and the varus malunion resulting from ender nail alone and any other implants can be prevented. Hence we conducted a study to evaluate the efficacy of a combined fixation procedure using ender nail and 6.5 mm cannulated cancellous screw for intertrochanteric fractures. The advantage of ender nailing and cannulated cancellous screw includes: (1) close reduction of fracture which decreases the blood loss and chance of infection

(2) controlled collapse of the fracture (3) rotational stability (4) load bearing capacity of the implant.

Materials and Methods

We have done a retrospective study of intertrochanteric fracture of femur operated with ender's nailing and cannulated cancellous screw at our institute with follow up of 9 - 12 months. Our study included 50 patients having intertrochanteric fracture. Inclusion criteria: all patients having intertrochanteric fracture of femur with intact lateral wall of greater trochanter. Exclusion criteria: patients with intertrochanteric fracture having severe comminution of lateral wall of greater trochanter. Amongst various classification systems we have used Boyd and Griffin' classification for intertrochanteric fractures.^[19] Diagnosis of type of the fracture is done by radiographs of the involved hip with femur (e.g. figure 1). After general assessment of the patient routine blood investigation that includes complete blood count, serum urea and creatinine, blood sugar and blood group are done as part of preoperative workup. Patient is taken in operation theatre and anaesthetised and shifted to fracture table in supine position. Fracture reduction is done under IITV guidance. After confirming the reduction, painting and draping of operative area was done. Skin incision of 4 to 5 cm is put over medial aspect of lower third of thigh centring on upper pole of patella and after incising the fascia vastus medialis is elevated and superior medial genicular vessels are identified and cauterised. This is an entry point of the ender nailing. Two or three Enders nail is introduced from entry side across fracture in the head of femur after giving 20° of posterior bend of tip with Kuderna's bending device.^[20] After that one or two 6.5 mm cancellous cannulated screw are introduced from base of greater trochanter in the head of femur (e.g. figure 2). Post-operative protocol^[21]: (a) Antibiotics: In our institute we never give antibiotics in our patients except indicated for some other purpose (b) Analgesics are given as and when required (c) Quadriceps physiotherapy: Strengthening exercise and calf pumping are started as soon as the patient is out of anaesthesia, followed by knee and ankle mobilization on post-operative day 1 (d)

Patients are advised to walk partial weight bearing walking with walker as soon as tolerable usually after 3 to 4 days (e) Sutures are removed on 12th post-operative day (f) Hospital stay: Patient is discharged as soon as the wound and general condition of the patient is satisfactory usually 4 to 5 days (g) Full weight bearing walking was allowed after assessing for radiological and clinical union usually at 6 to 8 weeks. (h) Follow up: Patient is asked to come for follow up 1,5,3 and 6 months from the date of surgery. At each follow up patient is assessed clinically as per Harris Hip score^[23] and x ray AP/LAT view of hip with femur is taken. Knee is also x-rayed as and when indicated.



Figure-1: Intertrochanteric Fracture

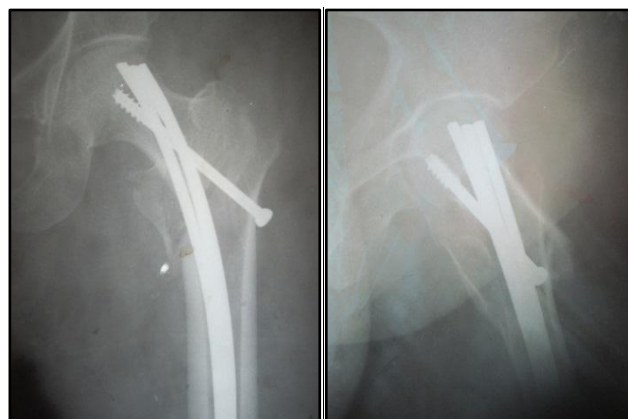


Figure-2: Post-Operative Radiograph (Antero-Posterior View & Lateral View)

Results

Table-1: Age Distribution

Age Groups (in years)	No. of Patients
< 60 years	21
≥ 60 years	29
Total	50

In our study of 50 patients (Male – 62% and Female – 48%) the youngest one was of 18 years old and the oldest one was of 80 years old. Average age of presentation is 59 years.

Table-2: Mode of Injury

Mode of Injury	Age	No. of Patients	No. of Patients
High Velocity	< 60 years	12	18
	≥ 60 years	6	
Low Velocity	< 60 years	8	32
	≥ 60 years	24	
Total		50	50

Above data shows that low velocity trauma due to domestic fall down is common cause of intertrochanteric fracture. The patients who developed the fracture due to low velocity were ≥ 60 years of age (75%), while high velocity trauma caused fracture in patients of less than 60 years of age (66%).

Table-3: Patients according to Classification

Boyd and Grifinn Classification	Number of Patients
Type-1	8
Type-2	38
Type-3	0
Type-4	4
Total	50

In study of 50 patients, according to Boyd and Griffin’s classification 76% patients were of type 2, 16% patients were of type 1 and 8% patients were of type 4.

Ender nailing along with insertion of cannulated cancellous screw is a simple procedure with short operating time. In our institute the average time taken for the surgery was 52 minutes. In our series the mean union time was 7 weeks .Partial weight bearing walking was started as soon as possible. Out of 50 patients 36 patients started partial weight bearing walking within first week of surgery which helped in collapse of the fracture which is controlled by the cancellous cannulated screw. Full weight bearing walking was started on an average of 7 weeks.

Table-4: Complications

Complications	Number of Patients
Malunion	1
Nail backout	1
Infection	0
Nonunion	0

In our study the above data clearly indicates the success of the procedure. Only one patient had

fracture that was united in little varus. One patient had backing out of nail but clinically patient had no symptoms which again prove the role of posterior bending of the end of the nail. The most common immediate complication was soakage at operated site which in all cases resolved after the change of first dressing.

Table-5: Results Based on Harris Hip Score

Results	Number	Percentage (%)
Excellent	26	52
Good	17	34
Fair	4	8
Poor	3	6

In our study of 50 patients 86% of the patients had excellent to good results and 14% had fair and poor results.

Table-6: Neck Shaft Angle

	Immediate Post Op	Final	Difference
Neck Shaft Angle	133.36	131.9	1.52

In our study all fractures are collapsed in desired direction which is evidenced by backing out of screw. The average immediate post-operative neck shaft angle is 133.36° and the neck shaft angle at final follow up is 131.9° with average difference of neck shaft angle during the period of union is 1.52° which proves the role of cannulated cancellous screw in the controlled collapse of the fracture and union with preservation of neck shaft angle and prevention of varus malalignment.

Discussion

Many types of internal fixation devices have been introduced for intertrochanteric fracture. Any surgical treatment with fixation devices for this fracture should provide sufficient fixation of the fracture to allow early mobilization of the fractured limb, to obtain fracture union, and to minimize the complications such as delayed union or non-union, penetration of the nail into the hip joint and distal migration. There are no reports of the combined procedure of Ender nailing and compression screw to best of our knowledge for intertrochanteric fracture in English language literature. By incorporating the tensile property of Ender nails along with a compression screw, fracture reduction and prevention of rotation respectively are possible. A study of intertrochanteric fracture of femur treated by ender nailing and compression screw^[23] was done

in 2010. We have compared our results with this study. The mean age of presentation in our study is 60 years while the mean age in Gangadharan's study was 80 years. Ender nailing and cannulated cancellous screw is a closed procedure with minimal blood loss, preserving the fracture hematoma which helps in healing of fracture and at the same time keeps the fracture in well reduced position during the period of union. The average time taken for surgery is 52 minutes while it was 45 minutes in the other study. The union in our study occurs in mean period of 7 weeks which is earlier than the Gangadharan's study in which it was 10 weeks. In our study backing out of ender nail was seen in only one case as compared to 6 cases in the other study. Partial weight bearing walking was started as early as possible within first week of surgery which is comparable to Gangadharan's study in which partial weight bearing walking was started on 10th day. Cannulated Cancellous Screws passed along with Ender nail helps in Controlled Collapse of the fracture and keeps the fracture reduced and fixed in anatomical position- preventing malunion postoperatively. It is seen in both studies that none of the fractures united in malunion, no postoperative infection, and no nail penetration in hip joint and not even a single case of non-union.

Conclusion

After the study of results of ender nailing and cannulated cancellous screw in the treatment of Intertrochanteric Fractures of Femur our conclusions are as follow: (1) Intertrochanteric fractures are mainly resulting from low velocity trauma in older population and high velocity trauma in young people. (2) Ender nail and cannulated cancellous screw has given excellent to good results in the management of the intertrochanteric fracture. (3) Ender nail and cannulated cancellous screw is a closed procedure with minimal blood loss, preserving the fracture hematoma which helps in healing of fracture and at the same time keeps the fracture in well reduced position during the period of union. (4) Cannulated Cancellous Screws passed along with Ender's nail helps in controlled collapse of the fracture and keeps the fracture reduced and fixed in anatomical position- preventing malunion postoperatively. (5) As compared to other

modalities in our study there is not even a single case of infection as well as very few postoperative complications. (6) The procedure takes less time and the patient can be mobilized fast postoperatively as well after fixation with ender nail and cannulated cancellous screw.

References

1. Rockwood CA, Green DP, Bucholz RW, editors. Fracture in adults. 4th ed. Philadelphia: Lippincott;1996.
2. Canale ST, Beaty JH. Campbell's Operative Orthopaedics.11th Ed. New york:Elsrvier;2008.
3. Singh M, Nagrath AR, Maini PS. Changes in Trabecular Pattern of the Upper End of the Femur as an Index of Osteoporosis. J Bone Joint Surg Am 1970;52:457-467.
4. Garden R. The structure and function of the proximal end of femur. J bone Joint Surg Br 1961;43:576-589.
5. Kazakov K. Structure and Biomechanics Of The Proximal End Of The Femur. Eur J Orthop Surg Traumatol 1997;7(4):245-249.
6. Tencer AF. Biomechanics Of Fixation And Fractures. In: Bucholz RW, Heckman JD (edi). Rockwood and Green's Fractures in Adults. Philadelphia:Lippincott; 2010. p. 3-42.
7. Curtis MJ, Jinnah RH, Wilson V, Cunningham BW. Proximal femoral fractures a biomechanical study to compare intramedullary and extramedullary fixation. Injury 1994;25(2):99-104.
8. Ender J, Simon-Weidner R. Die Fixierung der trochantener bruche mit runden elastischen Kondylennageln. Acta Chir Austria 1970;1:40.
9. Rosenblum SF, Zuckerman JD, Kummer FJ, Tam BS. A biomechanical evaluation of the Gamma nail. J Bone Joint Surg Br. 1992 May;74(3):352-7.
10. Schipper IB, Steyerberg EW, Castelein RM, Heijden FH, Hoed PT, Kerver AJ, Vugt AB. Treatment of unstable trochanteric fractures. Randomised comparison of the gamma nail and the proximal femoral nail. J Bone Joint Surg Br. 2004;86:86-94.
11. Zickle RE. An intramedullary device for the proximal part of femur. J Bone Joint Surg 1976;58:866 - 72.
12. Jewett E. One piece angle nail for trochanteric fracture. J Bone Joint Surg Am 1941;23:803-810.
13. Simmermacher RKJ, Bosch AM, Van der Werken C. The AO/ASIF proximal femoral nail (PFN) a new device for the treatment of unstable proximal femoral fractures. Injury 1999;30:327-332.
14. Smith-Peterson M. Treatment of fracture of neck of femur by internal fixation. Surg Gyneol Obstet 1937;64:287 - 95.
15. Bridle SH, Patel AD, Bircher M, Calvert PT. Fixation of intertrochanteric fractures of the femur; A randomised prospective comparison of the gamma nail and the dynamic hip screw. J Bone Joint Surg Br 1991;73:330-4.
16. Yolmaz E, Karakurt L, Güzel H, Serin E. Evaluation of treatment results with the 95-degree AO/ASIF

- angular plate in intertrochanteric femur fractures. *Joint Dis Rel Surg* 2005;16:42-48.
17. Sadowski C, Lubbeke A, Saudan M, Riand N, Stern R, Hoffmeyer P. Treatment of reverse oblique and transverse intertrochanteric fractures with use of an intramedullary nail or a 95 degrees screw-plate; a prospective, randomized study. *J Bone Joint Surg Am* 2002;84:372-81.
 18. Ender J, Simon-Weidner R. Die Fixierung der trochantener bruche mit runden elastischen Kondylennageln. *Acta Chir Austria* 1970;1:40.
 19. Boyd H, Griffin L. Classification and treatment of trochanteric fracture. *Arch Surg* 1949;58:853-66.
 20. Kuderna H, Bohler N, Colby AJ. Treatment of intertrochanteric and subtrochanteric fracture of the hip by the Ender method. *J Bone Joint Surg* 1976;58:604-11.
 21. Harris W. An end result study using a new method of result evaluation. *J Bone Joint Surg Am* 1969;51:737-55.
 22. Koval KJ, Zuckerman JD. Functional Recovery After Fracture Of The Hip. *J Bone & Joint Surg Am* 1994;76:751-758.
 23. Sidhartha Gangadharan, MR Nambiar. Interochanteric fractures in elderly high risk patients treated with Ender nails and compression screw. *Indian J Orthop* 2010;44: 289-291.

Cite this article as: Dalal B, Amin T, Gandhi A, Shah R. Study of results of ender nailing and cannulated cancellous screw in the treatment of intertrochanteric fracture femur. *Int J Med Sci Public Health* 2013; 2:443-447.

Source of Support: Nil

Conflict of interest: None declared